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ICE-FLOW DIRECTION MOVEMENTS OF THE PRIPYAT AND POOZERYE GLACIATIONS WITHIN WESTERN BELARUS

Deposits and landforms of the Pripyat and Poozerye glaciations are widely represented in Western Belarus. Streamlined glacial landforms and compositional properties of moraines are important for the reconstruction of ice-flow directions and the geological activity of these ice-sheets. The Pripyat Glacier during its advance formed the West Polesyan Ice Stream, the Sozh and Poozerye Glaciers, the Neman and Riga Ice streams [Paleogeography…, 2002]. The West Polesyan Ice Stream occurred in the central part of the Bug River and the Upper Pripyat basins in south-western Belarus and also adjacent parts of Ukraine and Poland [Matoshko, 2011]. The maximum limit of the Neman Ice Stream passed along the southern boundary of the Grodno-Novogrudok strip of marginal uplands. The Riga Ice Stream covered only northern part of the studied area, adjacent parts of Lithuania and Eastern Poland.

Ice-flow directions and routs of the Scandinavian Ice Sheets were reconstructed on the basis of compositional properties of moraines, structural and geomorphological data. Ground moraines contain the in-depth information on ice-flow directions during the transgression phase of glaciations. Monolithic moraines dominate in Western Belarus with the thickness ranging from 1 to 5–12 m. Ground moraines of different age occur as broken covers with small inclinations to the north. Younger moraines overlap older ones and, cut them and under-moraine quaternary deposits over bed rock and even deeper into bed rocks.

A dominance of Scandinavian crystalline rocks over transit and local sedimentary rocks is a special feature of the petrographic composition of the Dnieper moraine. The main part of transit rocks relates to limestones and sandstones. Percentage of local rocks is higher than in Sozh and Poozerye moraines. Two indicators – 1) the ratio of limestone and dolomites to sandstones (3.0) and 2) the ratio of siltstones and argillites to sandstones, dolomites and limestone (0.04) – indicates the correlation of the Dnieper moraine composition with Devonian bed rocks in northern Latvia and northwestern Lithuania. A high content of epidote, pyrite, biotite, dolomite and siderite, zircons and minerals of metamorphic group in the mineralogical composition of the Dnieper moraine witnesses that it is associated with Paleozoic bed rock deposits within the northern part of the Baltic area.

Transit rocks according to petrographic composition of detritus material of the Sozh moraine (limestone, siltstones and argillites, dolomites) are prevailing comparing with Dnieper moraine. The share of sandstones, Scandinavian crystalline and local sedimentary rocks is decreasing. Keeping in mind the increased ratio of limestone and dolomites to sandstones (8.4) and the ratio of siltstones and argillites to sandstones, dolomites and limestone (0.19) the Sozh moraine has a relation with the matter composition of Paleozoic carbonate and Mesozoic terrigenous deposits, which are observed in western Lithuania. In southern part of the Neman Ice Stream the mineralogical composition of Sozh moraine slightly differs the Dnieper one. The content of ilmenite, tourmaline, ferrum hydroxide and phosphates is increased in the former one. Erratic indicators of crystalline rocks of the northern Sweden, Gulf of Bothnia, Aland Islands, southwestern Finland and the bottom of Baltic Sea were observed within the Sozh moraine.

Maximal content of transit rocks (limestone, dolomites, considerable number of siltstones and argillites) was revealed in gravel-pebble moraine fraction of the Riga Ice Stream. The content of crystalline rocks and sandstones decreases there. The ratio of limestone and dolomites to sandstones is maximal within it. The ratio of siltstones and argillites to sandstones, dolomites and limestone is smaller than in the Sozh moraine. Mineralogical indicators of the Riga Ice Stream within southern Lithuania are related to compositional properties of Mesozoic deposits in

remote northwestern areas. The most typical erratic indicators of this ice-stream marginal zone are the Aland Islands and southwestern Finland rocks, red Baltic quartz porphyry and Dalarna porphyry from Middle Sweden [Viiding etc., 1971].

Directions and movement paths of ice-streams in western Belarus were changed during different ice epochs (Fig. 1). The West Polesye Ice Stream of the Dnieper Ice Sheet flowed from north to south. It formed the West Polesye Lobe in the Bug River basin. Ice of this lobe fanned out from the axis and moved to southwest and southeast. The Neman Ice Stream of the Sozh glaciation moved forward to southeast and ended in the Upper Neman Lobe. On the transgressive phase the lobe was characterized by divergent movement, accompanied with appearance in its marginal zone of six active ice-tongues, which moved along glacial valleys in the southwestern, southern and southeastern directions. During the Last Glacial Maximum the Riga Ice Stream formed the Ozersk Lobe. It had close southwestern direction and better conditions for divergence. Submeridional and meridional ice tongues and ice sheds of tongues complicated the ice lobe margin.

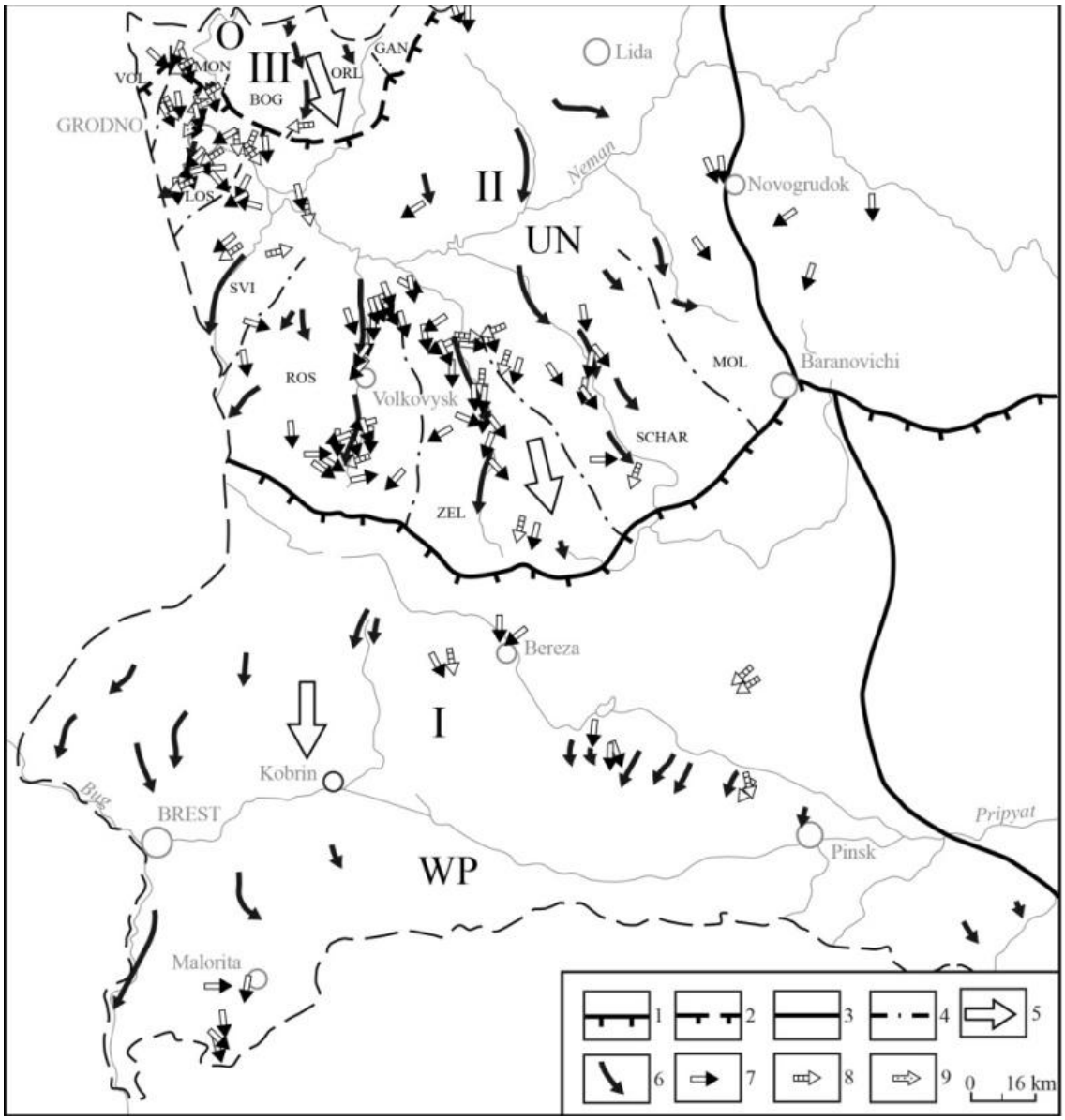

Fig. 1 Ice movement during the Pripyat and Poozerye glaciations within western Belarus

Legend: ice sheets and their boundaries: 1 – Sozh, 2 – Poozerye, 3 – ice divides in between streams and lobes, 4 – ice sheds in between tongues. Directions of ice movement according to data of: 5 – erratic indicators, 6 – orientation of glacial exaration valleys, 7 – glacial structures

and dislocations, 8 – textural elements of basal moraines, 9 – coarse-grained material of basal moraines. Ice streams: I – West Polesye, II – Neman, III – Riga. Glacial lobes: WP – West Polesye, UN – Upper Neman, O – Ozersk. Ice tongues of the Sozh Ice Sheet: VOL – Volkushansk, LOS – Lososna, SVI – Svisloch, ROS – Ross, ZEL – Zelva, SCHAR – Schara, MOL – Molchad; the same of the Poozerye Ice Sheet: MON – Monkovcy, BOG – Bogushevsk, ORL – Orlovsk, GAN – Ganelsk.

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